Distributed Mission Training

Air Force Research Laboratory
Warfighter Training Research Division

High Level Architecture (HLA) Operations and Research

Capt Geoffrey Barbier

15 March 1999

Overview

- History
- Activities & Milestones
  - Network Interface Unit (NIU) development
  - Roadrunner ‘98
  - Joint endeavors
  - Latency
  - Security management
- Questions

History

- 10 Sep 1996 USD(A&T) HLA requirement letter
  - All DoD simulators must be in process of implementing HLA by 01 Oct 1998
  - All DoD simulators must be HLA compliant or retired by 01 Oct 2000
- AFRL/HEA begins planning Oct 1997
  - Staff supplemented
  - Ongoing Training
- Defense Modeling and Simulation Organization (DMSO) HLA cadre visit AFRL/HEA Oct 1998
- Coyote ‘98

Activity 1
Network Interface Unit (NIU)
Software DIS to HLA

- **Description: Modify existing NIU software to work on an HLA network**
- **Objective: AFRL owned and maintained HLA compatible NIU, increase HEA competency level**
- **Start Date: Oct 1998**
- **Stop Date: Anticipate 1 Mar 1999**
- **Exit Criteria: Working prototype of an HLA Network for all AFRL/HEA maintained simulators**
- **Hardware: Existing PowerPC boards**
- **Software: AFRL/HEA NIU software**
- **Status: Waiting for VxWork release (Mar 1999), development continuing with “in-house” software**
- **AFRL/HEA Contact: Capt Geoffrey Barbier**

Activity 2
Roadrunner ‘98 Analysis

- **Description: Describe how Roadrunner ‘98 would be implemented as an HLA federation with DMSO HLA cadre support**
- **Objective: Gain experience and understanding of federation design and development process**
- **Start Date: 4 Dec 1998**
- **Stop Date: TBD**
- **Exit Criteria: Creation of HLA FOM for Roadrunner ‘98**
- **Hardware: TBD**
- **Software: TBD**
- **Status: Working with DMSO HLA cadre on FOM development**
- **AFRL/HEA Contact: Capt Geoffrey Barbier**

Activity 3
Joint Service Research Federation Object Model (FOM)

- **Description: Work with Air Force, Army, Navy, Marine Corps, and industry to establish a or select a prototype FOM that will ensure joint interoperability for virtual training and exercises**
- **Objective: Give DoD capability to implement HLA unilaterally to ensure interoperability and reduce cost**
- **Start Date: 3 Nov 98**
- **Stop Date: TBD**
- **Exit Criteria: Define, select, and recommend a FOM for joint-use; demonstrate by joint long-haul exercise**
- **Hardware: TBD**
- **Software: TBD**
- **Status: Planning, coordinating with AWTD**
- **AFRL/HEA Contact: Capt Geoffrey Barbier**

Activity 4
Multiple Joint Platform Exercise

- **Description: Air Force, Army, Navy, Marine Corps, training exercise- virtual joint operation**
- **Objective: Demonstrate joint capability and interoperability using an HLA network**
- **Start Date: 3 Nov 98**
- **Stop Date: TBD**
- **Exit Criteria: Successful demonstration of long haul multi-service virtual training capability**
- **Hardware: TBD**
- **Software: TBD**
- **Status: Planning - Roadrunner ‘99 or ‘00?**
- **AFRL/HEA Contact: Capt Geoffrey Barbier**

Activity 5
HLA Impacts to Latency

- **Description: Define requirements for and determine the impacts of the HLA on latency and network performance**
- **Objective: Ensure HLA implementations will meet the requirements of real-time simulation**
- **Start Date: 20 Oct 98**
- **Stop Date: TBD**
- **Exit Criteria: Determine maximum acceptable latency**
- **Hardware: TBD**
- **Software: TBD**
- **Status: Initial study underway, gathering latency data information during Coyote ‘98 using Simulator Network Analysis Project (SNAP) Hardware and PerfMetrics**
- **AFRL/HEA Contact: Capt Scott Ferrara**

Activity 6
HLA Security Management

- **Description: Create a solution to meet security requirements for DoD simulators in an HLA environment**
- **Objective: Allow participation in DMT training exercises among a wider variety of users**
- **Start Date: Jul 1998**
- **Stop Date: TBD**
- **Exit Criteria: Prototype certified system**
- **Hardware: TBD**
- **Software: TBD**
- **Status: Planning**
- **AFRL/HEA Contacts: Capt Geoffrey Barbier**

Summary

- History
- Activities & Milestones
  - NIU development
  - Roadrunner ‘99
  - Joint endeavors
  - Latency
  - Security management
- Questions...

Backup Slides

Overview

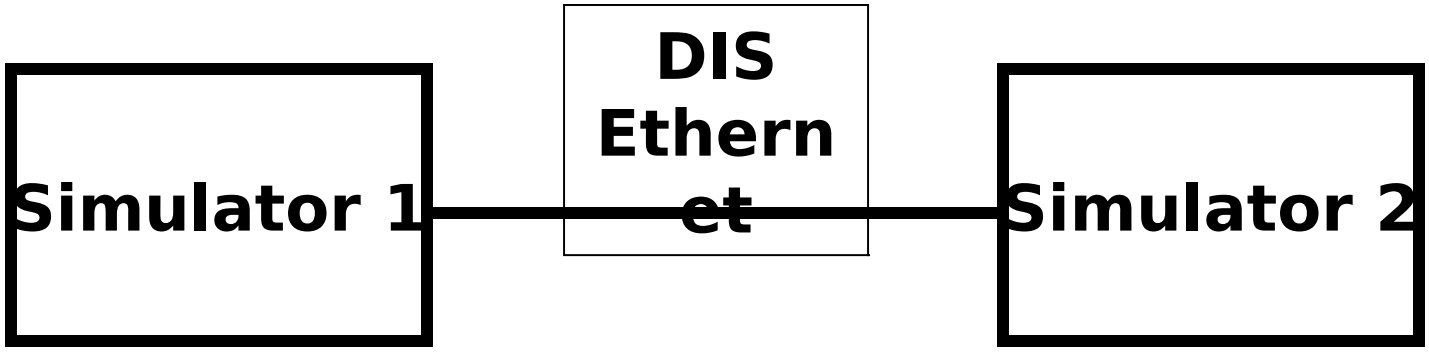
- **Networked Simulators**
- **HLA Networked Simulator**

Networked Simulators

- Similar to Connecting Office Computers
  - Locally (Interoffice)
  - Long Haul (Base to Base)
- Using Commercial Off The Shelf (COTS) Hardware (Ethernet)

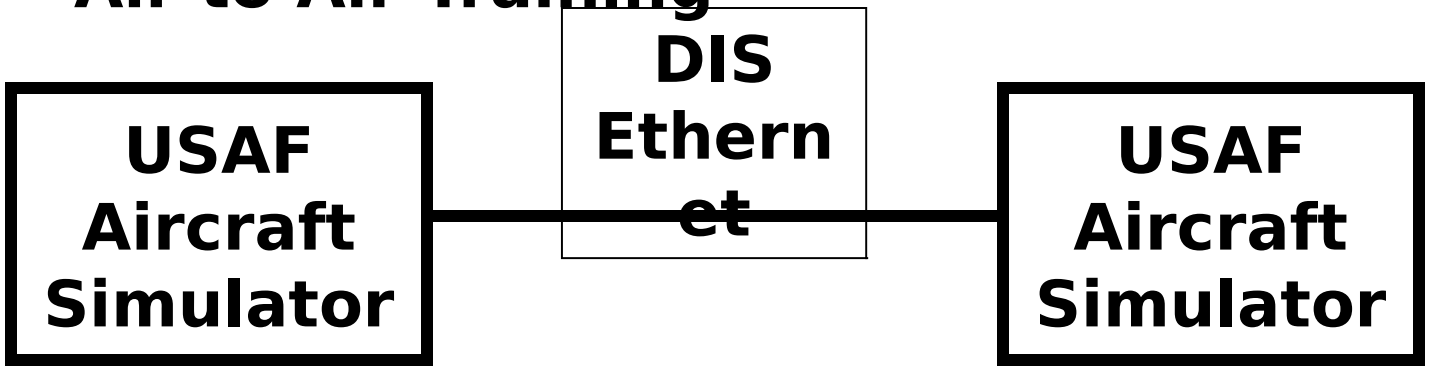
Networked Simulators

- Simulators “Talk” to Each Other Using Standard Language for Real-Time Simulation
- Distributed Interactive Simulation (DIS) Protocol
- DIS is an Industry Standard for Networking Simulators



Networked Simulators

- DIS Takes Flight Simulators Beyond Emergency Procedures and Instrument Approaches
- Benefits of Networking Simulators
  - Formation Training
  - Joint Service Operations
  - Mission Rehearsal
  - Air to Air Training



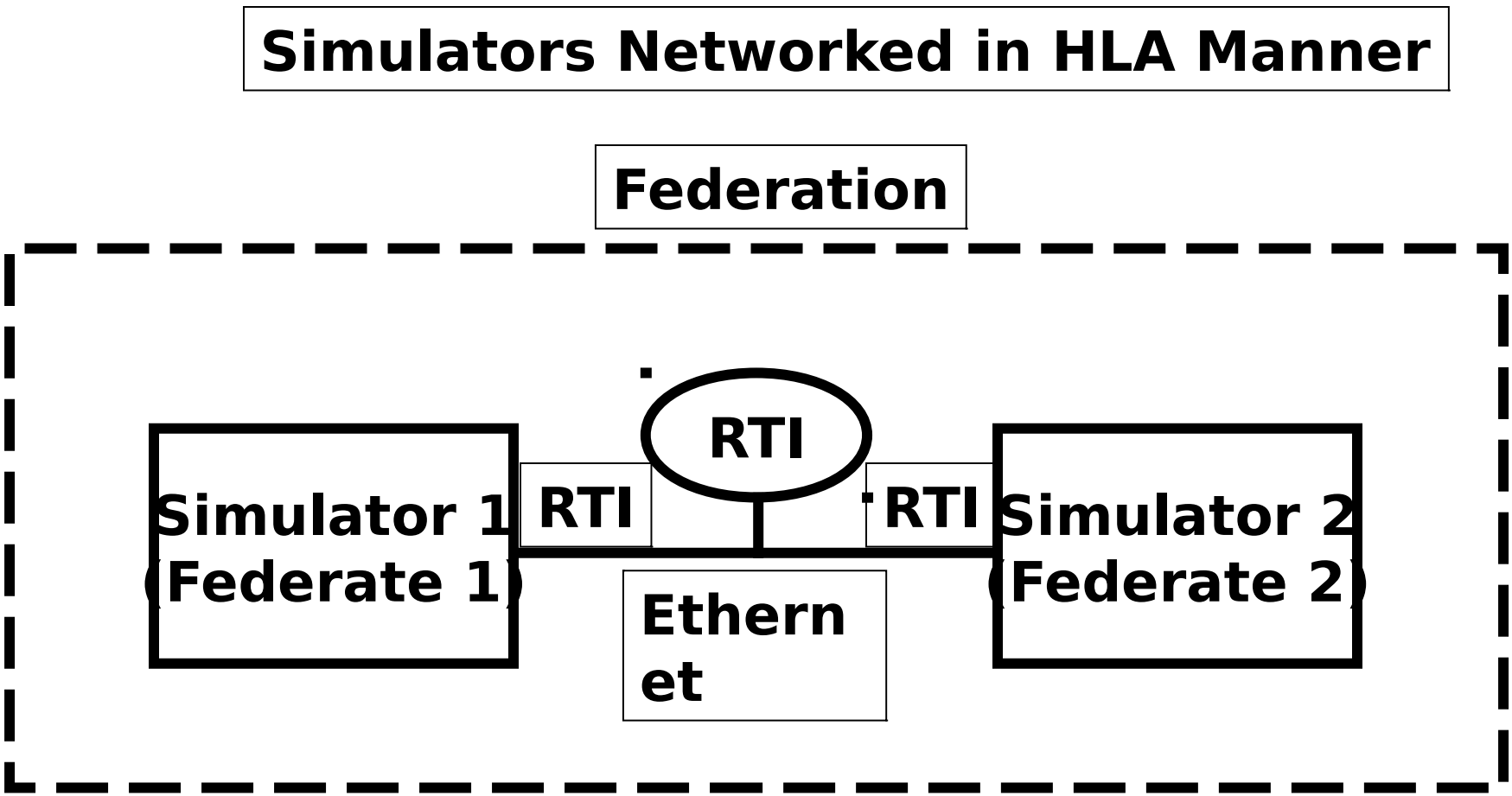
HLA Networked Simulators

- **DoD Modeling and Simulation Master Plan Created Technical Architecture for DoD simulators**
- **Mandated High Level Architecture (HLA)**
- **“Building Code” for Communication Between Simulators**
- **Fosters Interoperability and Reuse**
- **Requires Simulators Pass Conformance Testing**
- **However, HLA Conformance Does not Guarantee “Plug-n-Play” Interoperability-- Building Code, Not a Blueprint**
- **DIS was Blueprint**

HLA Networked Simulators

- **HLA Buzz Words**
  - **Federate = Simulator**
  - **Federation = Group of Simulators (Federates) That Communicate With Each Other**
  - **Simulation Object Model (SOM) = Software Definition of the Simulator (Federate)**
  - **Federation Object Model (FOM) = Software Definition of the Communication Between Simulators (Federates)**
  - **Run-Time Infrastructure (RTI) = Software Managing Communication Between Simulators (Federates)**

HLA Networked Simulators



Summary

- **Networked Simulators**
- **HLA Networked Simulator**